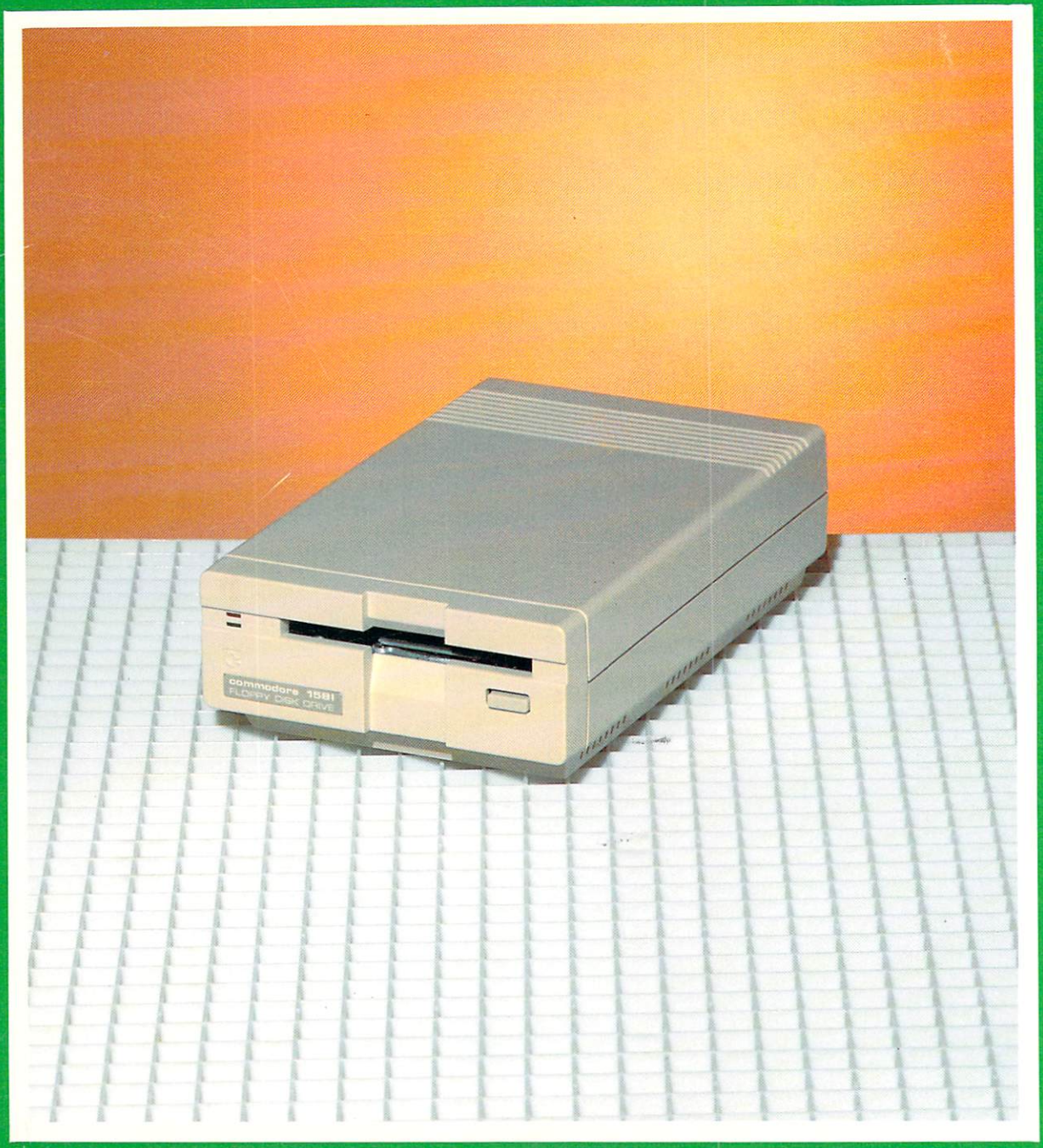
HOWARD W. SAMS & COMPANY CD22 09058

COMPUTERFACTS®

Technical Service Data

COMMODORE®
MODEL 1581
DISK DRIVE



FEATURES COMPLETE SCHEMATICS • PRELIMINARY SERVICE CHECKS • TROUBLESHOOTING TIPS • EASY-READ WAVEFORMS • REPLACEMENT PARTS LISTS • SEMICONDUCTOR CROSS-REFERENCE

PRELIMINARY SERVICE CHECKS

This data provides the user with a time-saving service tool which is designed for quick isolation and repair of Computer system malfunctions.

Check all interconnecting cables for good connection and correct hook-up before making service checks.

Always turn Printer Off before connecting or disconnecting connectors, boards or Computer.

TEST EQUIPMENT AND TOOLS

TEST EQUIPMENT

Digital Volt/Ohm Meter
Logic Probe
Frequency Counter
Disk Drive Tester or Test Program
Logic Pulser

TOOLS

Head Cleaning Equipment
Contact and Switch Cleaner (non spray type)
Phillips Screwdriver
Flat Blade Screwdriver
IC Insertion and Removal Tools 24 and 28 pin
Low Voltage Soldering Iron
Desoldering Equipment

REPLACEMENT PARTS

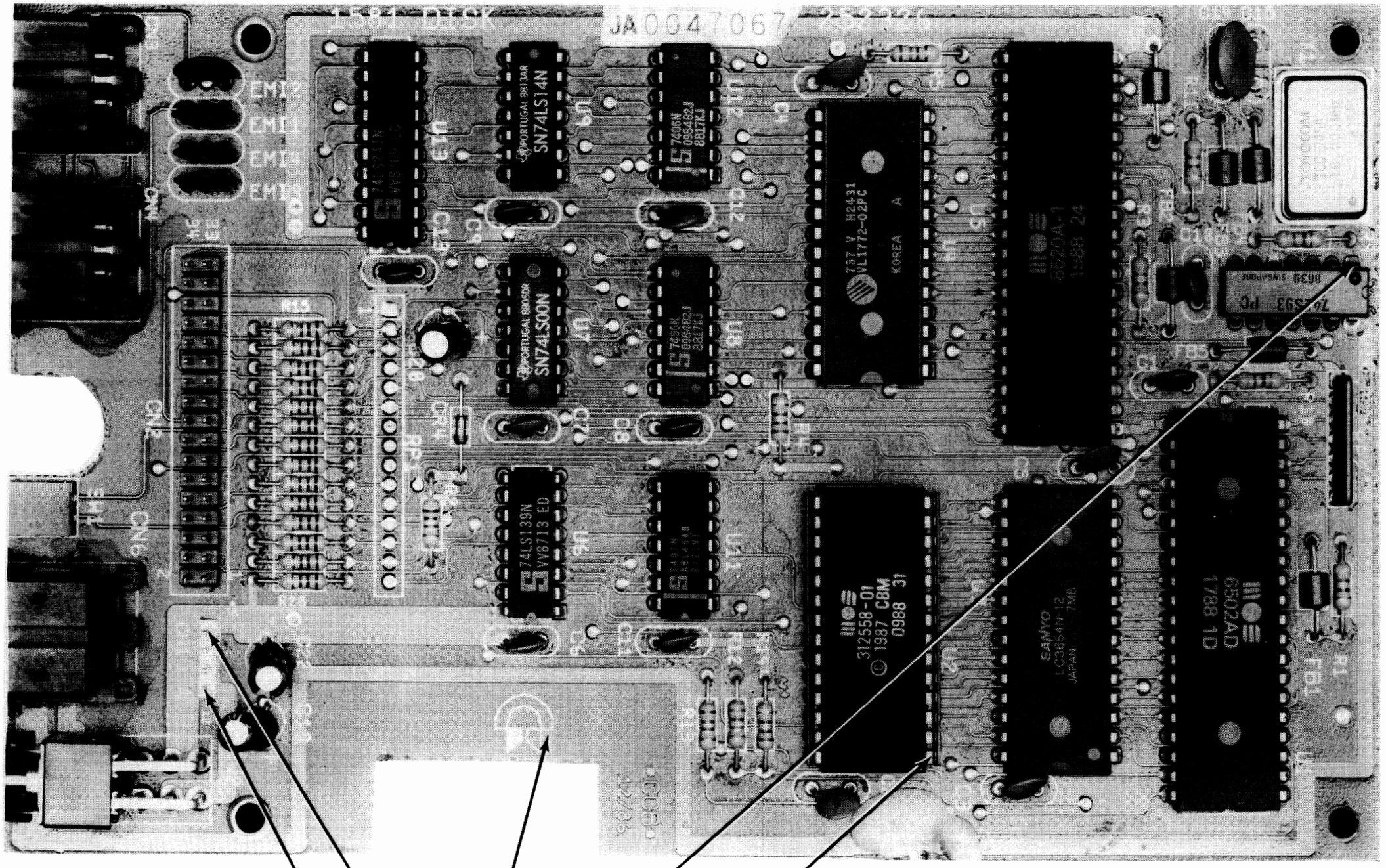
Item	Part No.	Description
SW1		Power Switch
U2	312558-01	ROM

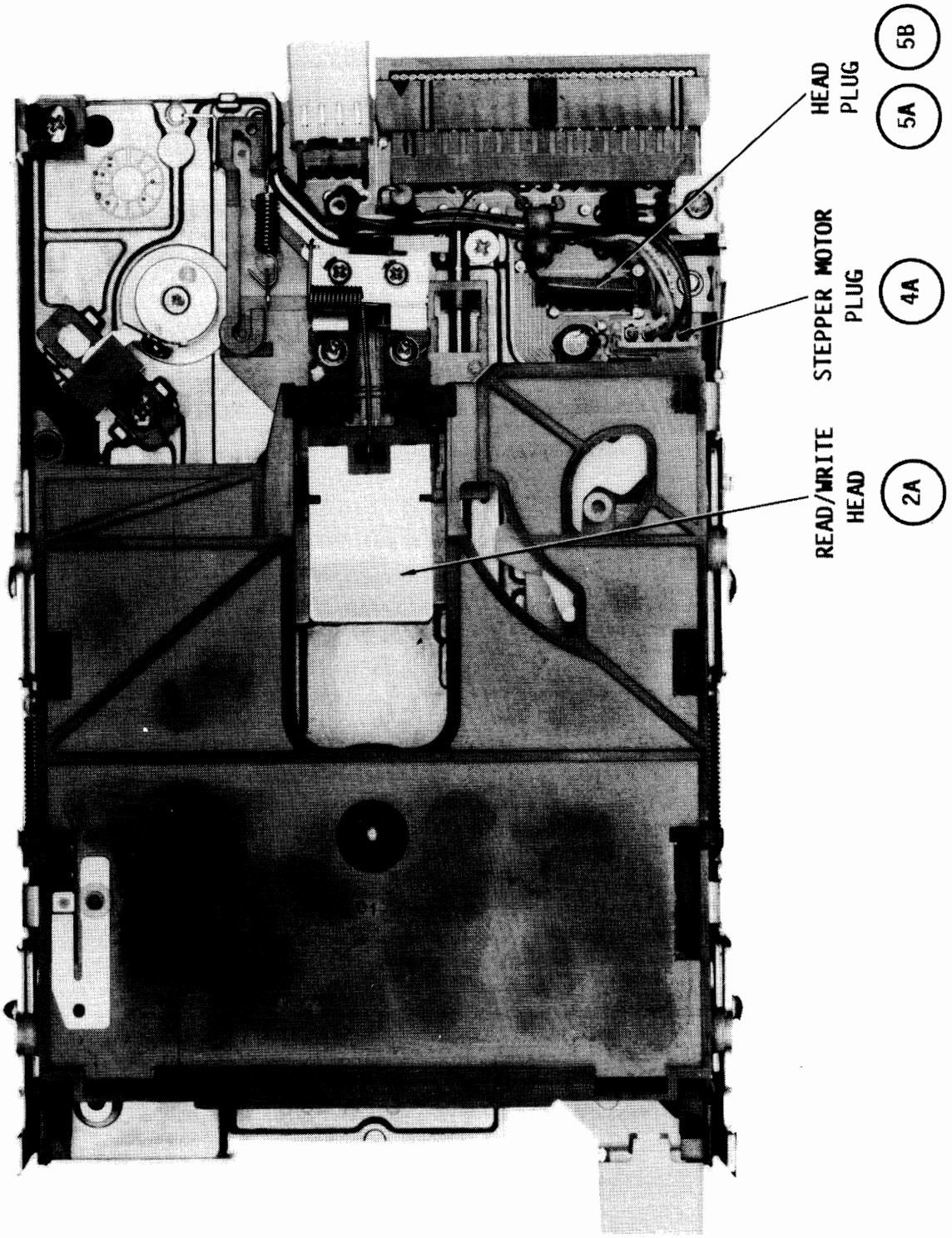
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4300 West 62nd Street, P.O. Box 7092, Indianapolis, Indiana 46206 U.S.A.

The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co. as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co. by the manufacturers of the particular type of replacement part listed.

89CD19086 DATE 7-89

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12V
1B
5V
1A
CONTROLLER
LOGIC BOARD
3B
4B
5C
IC(U10)
1D
ROM IC(U2)
1E



L LOGIC BOARD

CHASSIS-TOP VIEW

PRELIMINARY SERVICE CHECKS (Continued)

SERVICE CHECKS

MATCH THE NUMBERS ON THE INTERCONNECTING DIAGRAM AND PHOTOS WITH THE NUMBERS ON THE SERVICE CHECKS TO BE PERFORMED.

① DRIVE IS DEAD

(A) Check for 5.0V at pin 1 of connector CN6 and pin 4 of CN1. If the voltage is missing check the power supply by substitution.

(B) Check for 12V at pin 4 of connector CN6 and pin 1 of CN1. If the voltage is missing check the power supply by substitution.

(C) Check ON/OFF switch for continuity.

(D) Check for a clock frequency of 16.0MHz at pin 1 of Binary Counter IC (U10).

(E) Check the ROM IC (U2) by substitution.

② DRIVE OPERATION IS ERRATIC

Check for possible interference from the monitor or other electronic equipment. Position the Disk Drive away from the monitor and other equipment and then check operation of the Drive.

(A) Clean the Head of the drive with a cotton swab or lint free cloth dampened with 91% isopropyl alcohol and dry with a lint free cloth.

NOTE: Head cleaning diskettes are not recommended because they may be too abrasive.

③ DRIVE MOTOR DOES NOT TURN DISK

(A) Check for a logic low at pin 16 of connector CN2. Short pins 16 and 18 of CN2 together.

(B) If the Drive motor will turn, check the controller logic board by substitution.

(C) If the Drive motor will not turn check the Drive board by substitution.

④ STEPPING MOTOR INOPERATIVE

(A) Check the connector of stepping motor for loose connection.

(B) Check the controller board by substitution.

(C) If the stepping motor is still inoperative check the stepping motor by substitution. Replace the Drive board unit.

⑤ READ/WRITE FUNCTION INOPERATIVE

(A) Check the Head connector for open or intermittent connections.

(B) Check the resistance of the Read/Write/Erase sections of Head. Check for continuity between pins 1, 2, 3 and 4, and check for continuity between pins 8, 7, 6 and 5 of the Head Cable.

(C) Check the Controller board by substitution.

(D) Check the Drive board unit by substitution.

PRELIMINARY SERVICE CHECKS (Continued)

DISASSEMBLY INSTRUCTIONS

DISASSEMBLY INSTRUCTIONS

Remove two screws from cabinet bottom which hold cabinet top. Lift cabinet top from unit. Remove two connectors CN1 and CN2 from plugs on the Disk Drive mechanism. Remove four screws holding drive mechanism and drive board to cabinet bottom and remove the mechanism. Remove one screw from front panel holding LED board, remove four screws holding the Main Logic board to the bottom panel and remove the Logic board.

GENERAL OPERATING INSTRUCTIONS

DIRECTORY

To get a Directory (list of programs on a diskette) type LOAD "$",8 and press the RETURN key. After the Directory is Loaded, type LIST and press the RETURN key to list the Directory on the Monitor screen.

INITIALIZING THE DRIVE RESET

To initialize the Disk Drive, type OPEN 15,8,15,"I":CLOSE 15 and press the RETURN key. If a FILE OPEN error message appears on the screen, it means that file 15 has been already opened by a previous operation and was not properly closed. Type CLOSE 15 and press the RETURN key, then repeat the initializing procedure.

LOADING PROGRAMS

To load a program from the Disk Drive, type LOAD with the Program Name enclosed in quotes, followed by a ,8 and press the RETURN key. Example: LOAD "SAMS" ,8.

SAVING PROGRAMS

To save a program to the Disk Drive, type SAVE with the Program Name enclosed in quotes, followed by a ,8 and press the RETURN key. Example: SAVE "SAMS" ,8.

FORMATTING A DISKETTE

A blank diskette must be formatted before it will work in the Disk Drive. To format a diskette, insert a blank diskette into the Disk Drive. Type the following with a name for the diskette and a two character identification code enclosed in the quotes with NO:. Then, press the RETURN key. Example: OPEN 1,8,15,"NO:NAME,ID"CLOSE 1.

MISCELLANEOUS ADJUSTMENTS AND CHECKS

CLOCK FREQUENCY CHECK

Connect input of a frequency counter to pin 1 of Binary Counter IC (U10). Check for a frequency of 16.0MHz.

HEAD CLEANING INSTRUCTIONS

Use a lint free cloth or swab dampened with 91% isopropyl alcohol to clean disk drive heads and dry with a lint free cloth.

DISK DRIVE DEVICE NUMBER

The number 8 used in the Load and save procedures is the device number assigned to the Disk Drive. Two switches on the back of the Disk Drive determine the DEVICE No. of the drive according to their settings.

Left Switch	Right Switch	Device No.
UP	UP	8
DOWN	UP	9
UP	DOWN	10
DOWN	DOWN	11

MOTOR SPEED CHECK

Center and paste a strobe pattern (see Figure 1) on the spindle pulley on bottom of Drive. Insert a diskette into Disk Drive and close Drive door. Load a program from diskette or connect a jumper between pins 16 and 18 of connector CN2 on the Mechanism Drive board to keep Drive running. Use the outer trace of pattern on spindle pulley if 60 HZ AC power is being used or use inner trace of pattern if 50 Hz AC power is being used. Use a fluorescent light to view the pattern. The pattern should stand still or barely move.

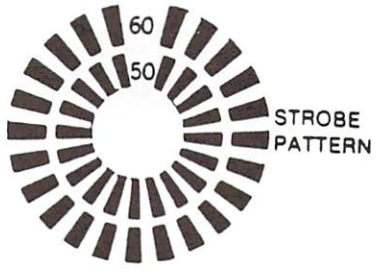
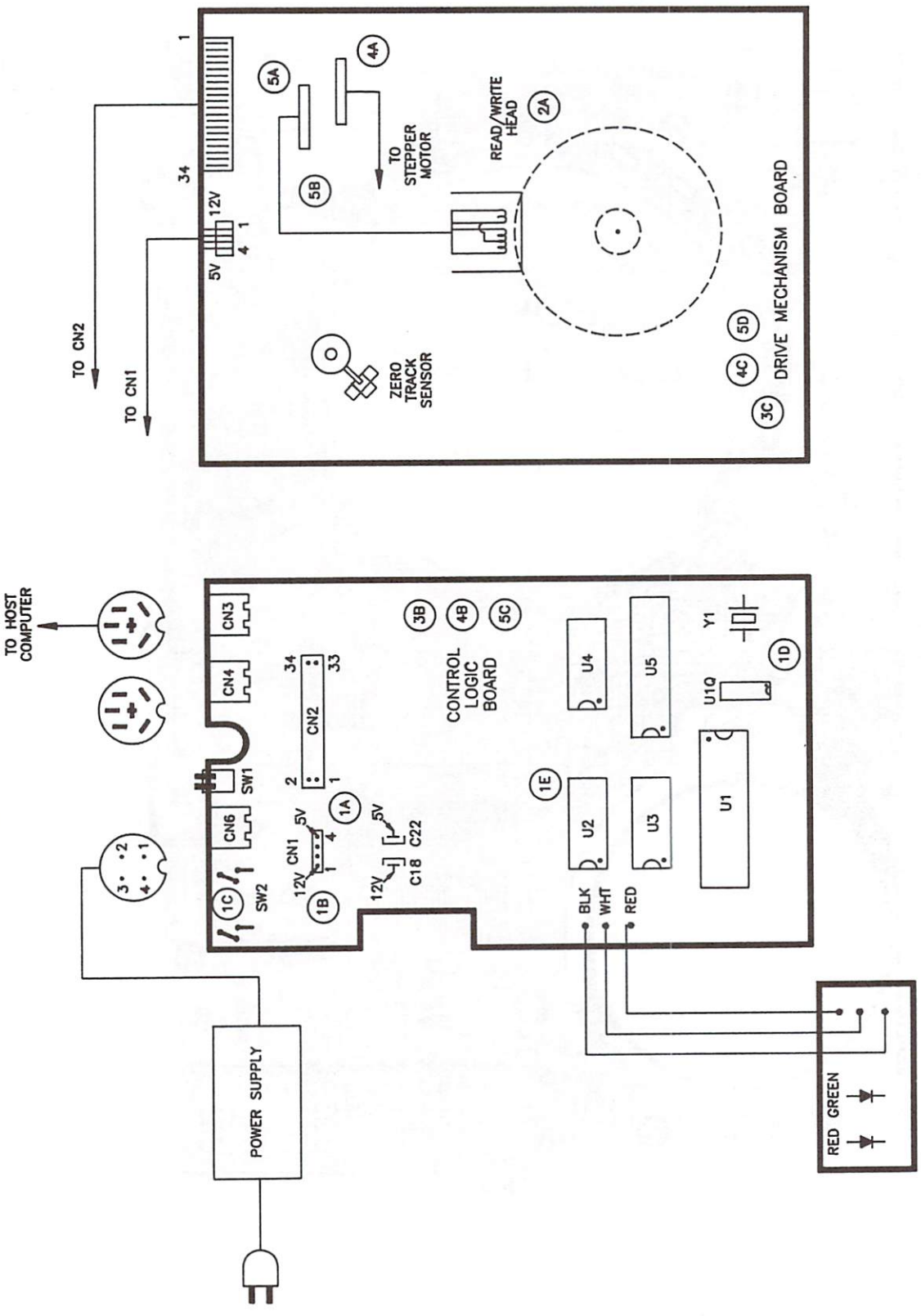
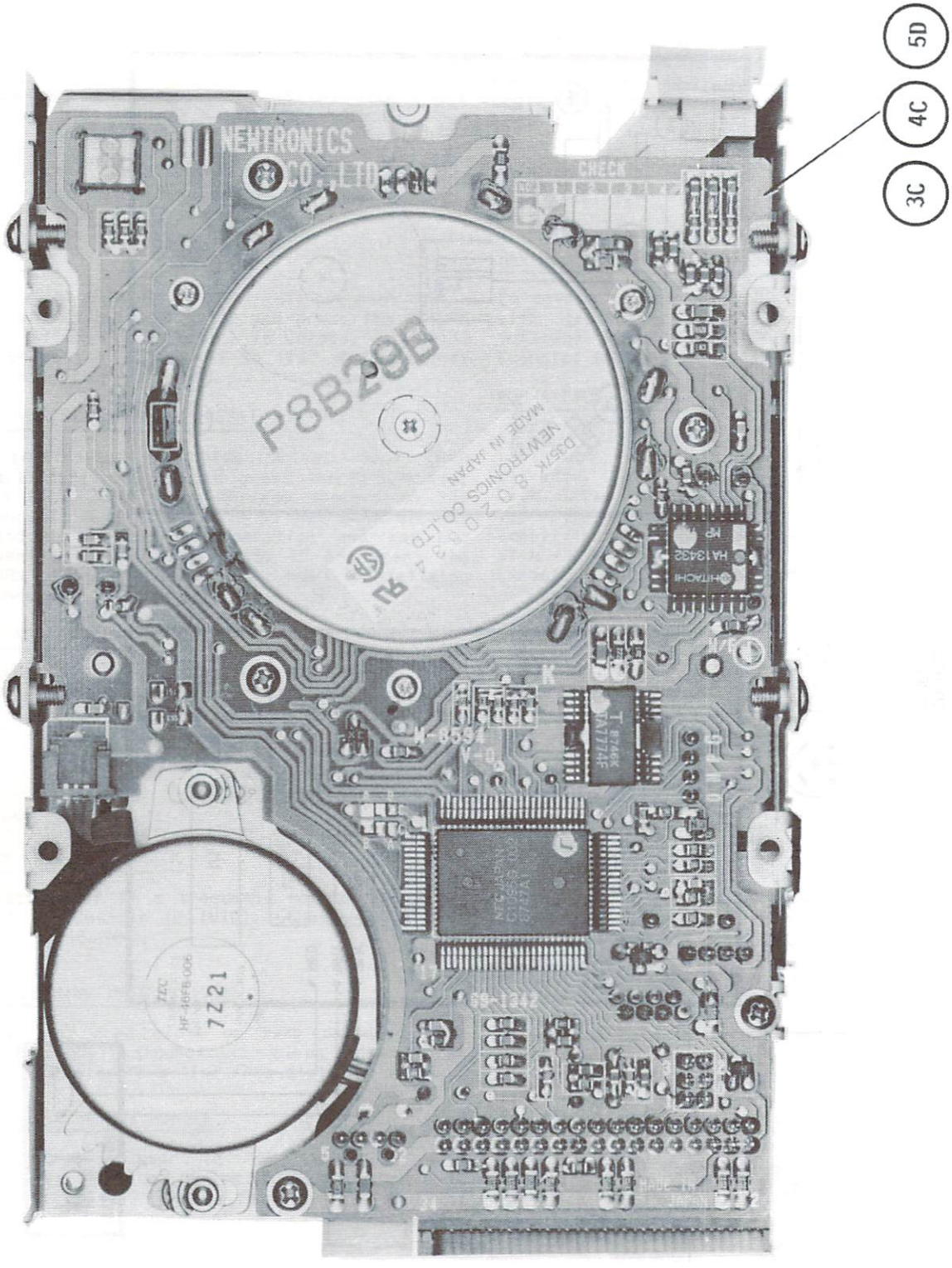


FIGURE 1



CD22 COMMODORE MODEL 1581

INTERCONNECTING DIAGRAM



CHASSIS- BOTTOM VIEW

PRELIMINARY SERVICE CHECKS (Continued)
PREVENTATIVE MAINTENANCE

ENVIRONMENT

Computers perform best in a clean, cool area that is below 80 degrees Fahrenheit and free of dust and smoke particles. Even though home Computers are not affected by cigarette smoke as much as commercial Computers are affected, it is better to mantain a smoke-free area around the Computer. Do not block cabinet vents of Computer, Monitor, Printer, or other power devices.

ELECTRICAL POWER

Variations in the line voltage can affect the Computer. Try to avoid these fluctuations by using an AC receptacle that is on a power line not used by appliances or other heavy current demand devices. A power-surge protector, power-line conditioner, or non-interruptable power supply may be needed to cure the problem. **Do not** switch power On and Off frequently.

KEYBOARD

Liquids spilled into the Keyboard can ruin it. Immediately after a spill occurs, disconnect the Computer power plug from AC power outlet. Then, if circuitry or contacts are contaminated, disassemble the Keyboard and carefully rinse the Keyboard printed circuit board with distilled water and let it dry. Use a cotton swab to clean between the keys. Use a non-abrasive contact cleaner and lint-free wipers on accessible connectors and contacts.

DISK DRIVES

Clean the read/write heads of the Disk Drives about once a month or after 100 hours usage. Use only an approved head cleaning kit.

Handle carefully to preserve proper disk head alignment. A sudden bump or jolt to the Disk Drives can knock the disk head out of alignment. If Disk Drive must be transported, place an old disk in slot and close door during transport.

Store disks in their protective covers and never touch the disk surface. Observe the disk handling precautions usually found on the back of disk protective covers.

PRINTERS

Carefully vacuum the Printer regularly. Wipe surface areas clean using a light all-purpose cleaner. Do not oil the machine. The oil will collect abrasive grit and dust. The dust will act as a blanket. This can cause components to overheat and fail.

STATIC ELECTRICITY

Static electricity discharge can affect the Computer. In order to minimize the possibility, use anti-static mats, sprays, tools and materials, and maintain good humidity in the Computer environment.

MONITOR

Use an isolation transformer with any Monitor that does not come as part of the system since some Monitors use a HOT chassis (chassis connected to one side of the AC line). The face of the Monitor should never be left on for long period of time at high brightness level except when pattern is being changed periodically. Use caution when cleaning anti-glare screens, to preserve the glare-reduction feature.

Serial Interface Connector Signals and Functional Descriptions

The 1581 serial bus supports the newer (FAST) serial communication as well as the standard (SLOW) serial communication.

Pin No.	Signal	Direction	Function
Pin 1	SRQ Service Request	IN/OUT	Used by Fast serial bus as a bidirectional fast clock time. Unused by the Slow serial bus.
Pin 2	GND		Logic ground.
Pin 3	ATN Attention	IN	The host computer will bring this signal low, which in turn will generate an interrupt on the controller board. ATN is followed by a device address.
Pin 4	CLK	In/Out	CLK is used for timing the data sent on Slow serial bus.
Pin 5	DATA	In/Out	Data on the serial bus is transmitted one bit at a time.
Pin 6	Reset		This line will reset the peripheral upon host reset.

CD22 COMMODORE MODEL 1581



CD22 COMMODORE MODEL 1581

SAFETY PRECAUTIONS

See Page 4

PRELIMINARY SERVICE CHECKS

ENCLOSED

INDEX

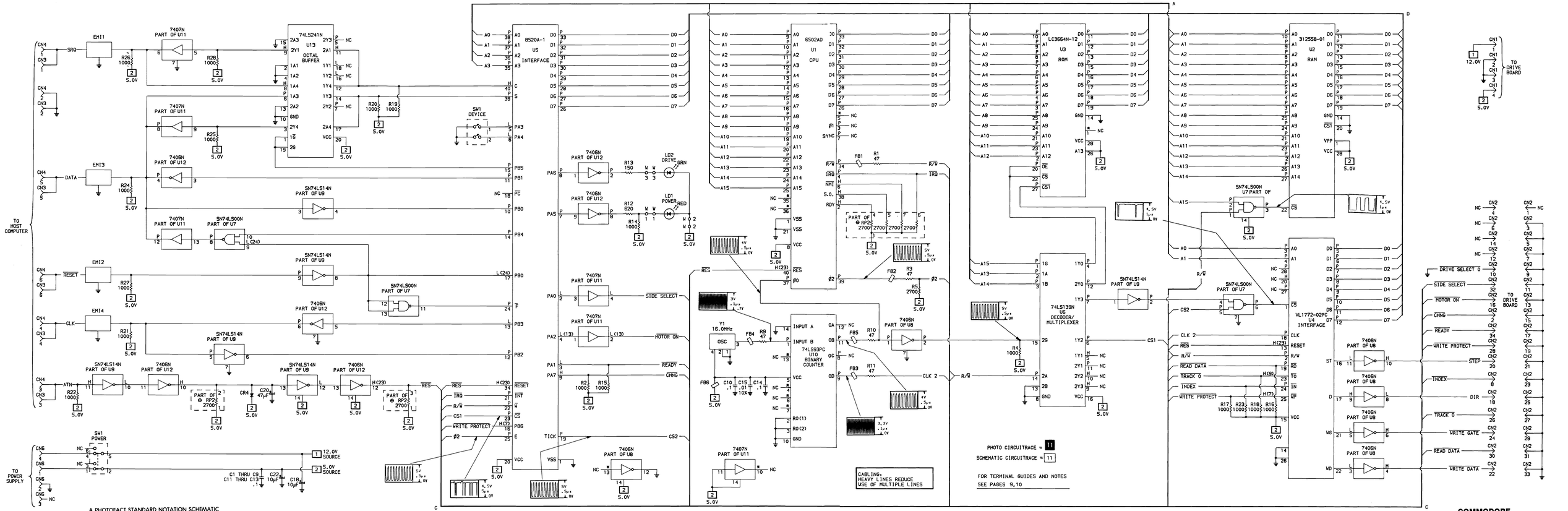
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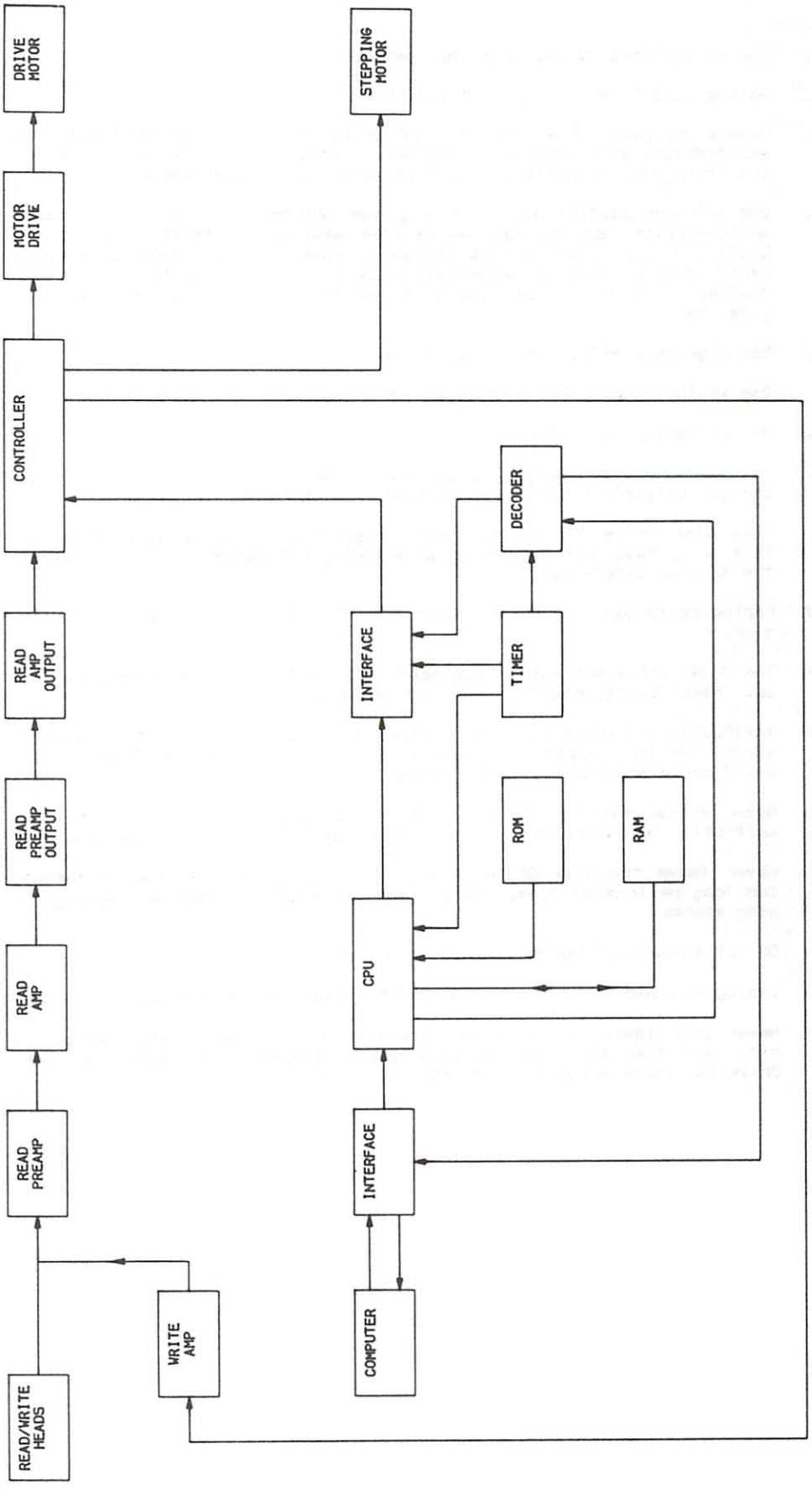
The listing of any available replacement part herein does not constitute in any case a recommendation, warranty or guaranty by Howard W. Sams & Co. as to the quality and suitability of such replacement part. The numbers of these parts have been compiled from information furnished to Howard W. Sams & Co. by the manufacturers of the particular type of replacement part listed. 89CD19086 DATE 7-89

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Printed in U.S. of America


COMMODORE
MODEL 1581
TO HOST COMPUTER
TO POWER SUPPLY
TO DRIVE BOARD
8520A-1 U5 INTERFACE
6502AD U1 CPU
LC3664N-12 U3 ROM
312558-01 U2 RAM
VL1772-02PC U4 INTERFACE
74LS241N U13 OCTAL BUFFER
74LS139N U6 DECODER/ MULTIPLEXER
74LS93PC U10 BINARY COUNTER
Y1 16.0MHz
SW1 POWER
SW1 DEVICE
LD1 POWER RED
LD2 DRIVE GRN
SRQ
DATA
RESET
CLK
ATN
SIDE SELECT
MOTOR ON
READY
CHNG
TRK
WRITE PROTECT
TICK
RES
IRQ
R/W
CS1
CS2
PHOTO CIRCUITRACE = 11
SCHEMATIC CIRCUITRACE = 11
FOR TERMINAL GUIDES AND NOTES SEE PAGES 9,10
CABLING: HEAVY LINES REDUCE USE OF MULTIPLE LINES
A PHOTOFACT STANDARD NOTATION SCHEMATIC WITH CIRCUITRACE
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BLOCK DIAGRAM



SAFETY PRECAUTIONS

1. Use an isolation transformer for servicing.

2. Maintain AC line voltage at rated input.

3. Remove AC power from the Disk Drive before servicing or installing electrostatically sensitive devices. Examples of typical ES devices are integrated circuits and semiconductor "chip" components.

4. Use extreme caution when handling the printed circuit boards. Some semiconductor devices can be damaged easily by static electricity. Drain off any electrostatic charge on your body by touching a known earth ground. Wear a commercially available discharging wrist strap device. This should be removed prior to applying power to the unit under test.

5. Use a grounded-tip, low voltage soldering iron.

6. Use an isolation (times 10) probe on scope.

7. Do not remove or install boards with AC power On.

8. Do not use freon-propelled sprays. These can generate electrical charges sufficient to damage semiconductor devices.

9. This Disk Drive is equipped with a grounded three-pronged AC plug. This plug must fit into a grounded AC power outlet. Do not defeat the AC plug safety feature.

10. Periodically examine the AC power cord for damaged or cracked insulation.

11. The Disk Drive cabinet is equipped with vents to prevent heat build-up. Never block, cover or obstruct these vents.

12. Instructions should be given, especially to children, that objects should not be dropped or pushed into the vents of the cabinet. This could cause shock or equipment damage.

13. Never expose the Disk Drive to water. If exposed to water, turn the unit Off. Do not place the Disk Drive near possible water sources.

14. Never leave the Disk Drive unattended or plugged into the AC outlet for long periods of time. Remove AC plug from AC outlet during lightning storms.

15. Do not allow anything to rest on AC power cord.

16. Unplug AC power cord from outlet before cleaning Disk Drive.

17. Never use liquids or aerosols directly on the Disk Drive. Spray on cloth and then apply to the Disk Drive cabinet. Make sure the Disk Drive is disconnected from the AC power line.

DISASSEMBLY INSTRUCTIONS

DISASSEMBLY INSTRUCTIONS

Remove two screws from cabinet bottom which hold cabinet top. Lift cabinet top from unit. Remove two connectors CN1 and CN2 from plugs on the Disk Drive mechanism. Remove four screws holding drive mechanism and drive board to cabinet bottom and remove the mechanism. Remove one screw from front panel holding LED board, remove four screws holding the Main Logic board to the bottom panel and remove the Logic board.

GENERAL OPERATING INSTRUCTIONS

DIRECTORY

To get a Directory (list of programs on a diskette) type LOAD "$",8 and press the RETURN key. After the Directory is Loaded, type LIST and press the RETURN key to list the Directory on the Monitor screen.

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To load a program from the Disk Drive, type LOAD with the Program Name enclosed in quotes, followed by a ,8 and press the RETURN key. Example: LOAD "SAMS" ,8.

SAVING PROGRAMS

To save a program to the Disk Drive, type SAVE with the Program Name enclosed in quotes, followed by a ,8 and press the RETURN key. Example: SAVE "SAMS" ,8.

FORMATTING A DISKETTE

A blank diskette must be formatted before it will work in the Disk Drive. To format a diskette, insert a blank diskette into the Disk Drive. Type the following with a name for the diskette and a two character identification code enclosed in the quotes with NO:. Then, press the RETURN key. Example: OPEN 1,8,15,"NO:NAME,ID"CLOSE 1.

MISCELLANEOUS ADJUSTMENTS AND CHECKS

CLOCK FREQUENCY CHECK

Connect input of a frequency counter to pin 1 of Binary Counter IC (U10). Check for a frequency of 16.0MHz.

HEAD CLEANING INSTRUCTIONS

Use a lint free cloth or swab dampened with 91% isopropyl alcohol to clean disk drive heads and dry with a lint free cloth.

DISK DRIVE DEVICE NUMBER

The number 8 used in the Load and save procedures is the device number assigned to the Disk Drive. Two switches on the back of the Disk Drive determine the DEVICE No. of the drive according to their settings.

Left Switch	Right Switch	Device No.
UP	UP	8
DOWN	UP	9
UP	DOWN	10
DOWN	DOWN	11

MOTOR SPEED CHECK

Center and paste a strobe pattern (see Figure 1) on the spindle pulley on bottom of Drive. Insert a diskette into Disk Drive and close Drive door. Load a program from diskette or connect a jumper between pins 16 and 18 of connector CN2 on the Mechanism Drive board to keep Drive running. Use the outer trace of pattern on spindle pulley if 60 HZ AC power is being used or use inner trace of pattern if 50 Hz AC power is being used. Use a fluorescent light to view the pattern. The pattern should stand still or barely move.

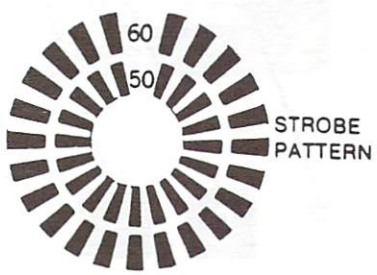
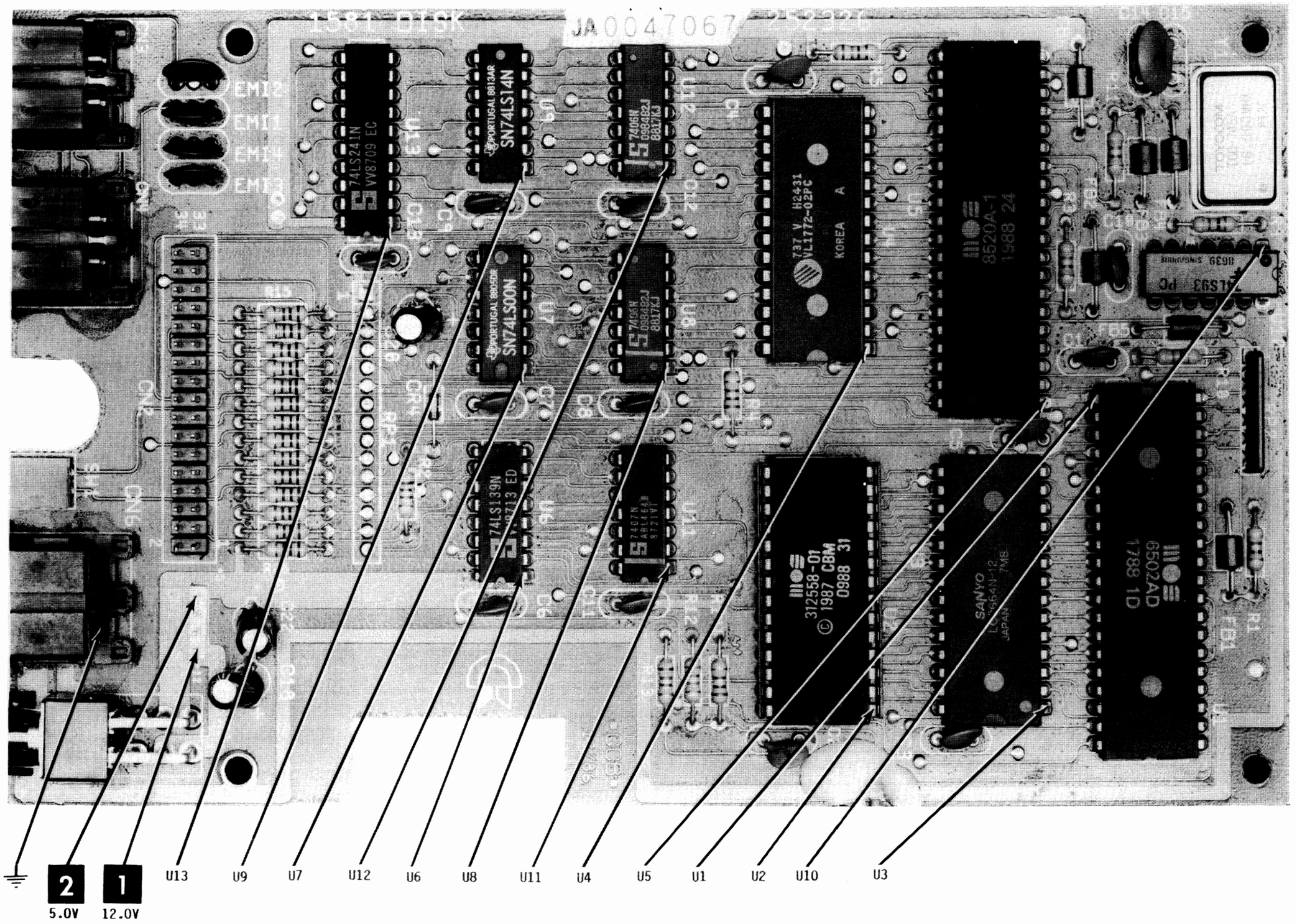
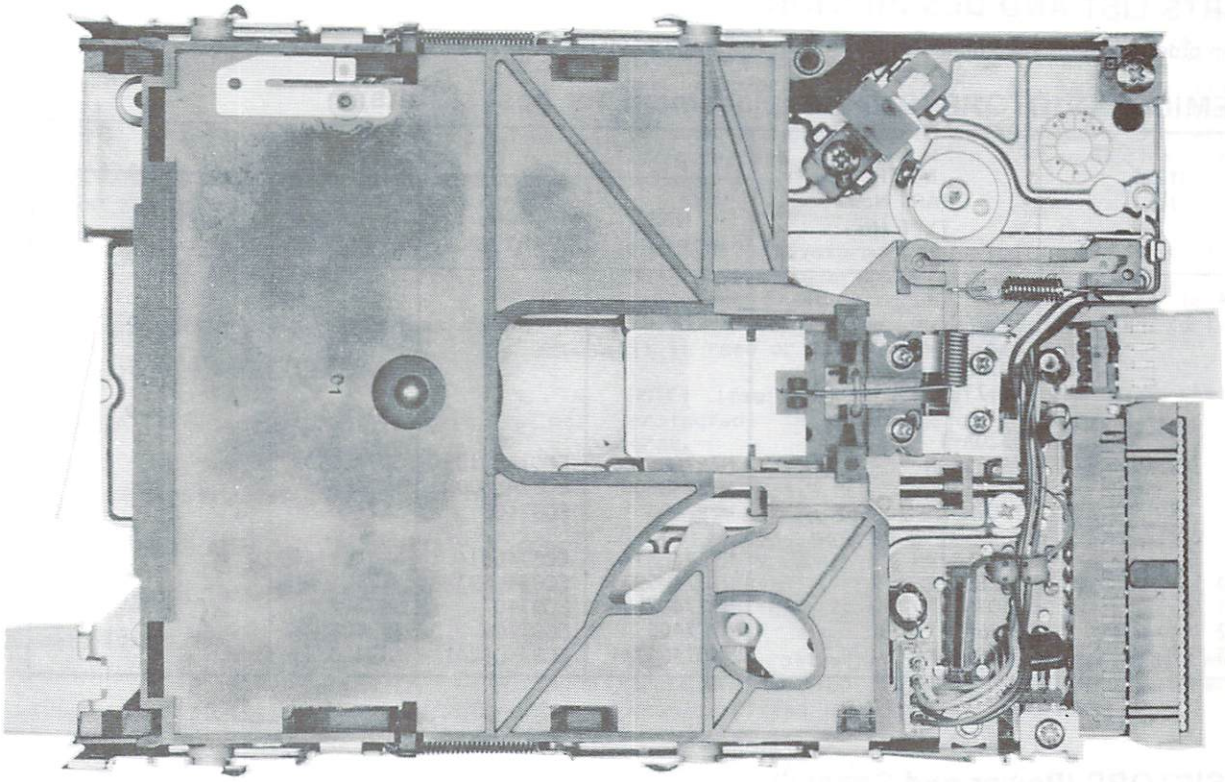


FIGURE 1

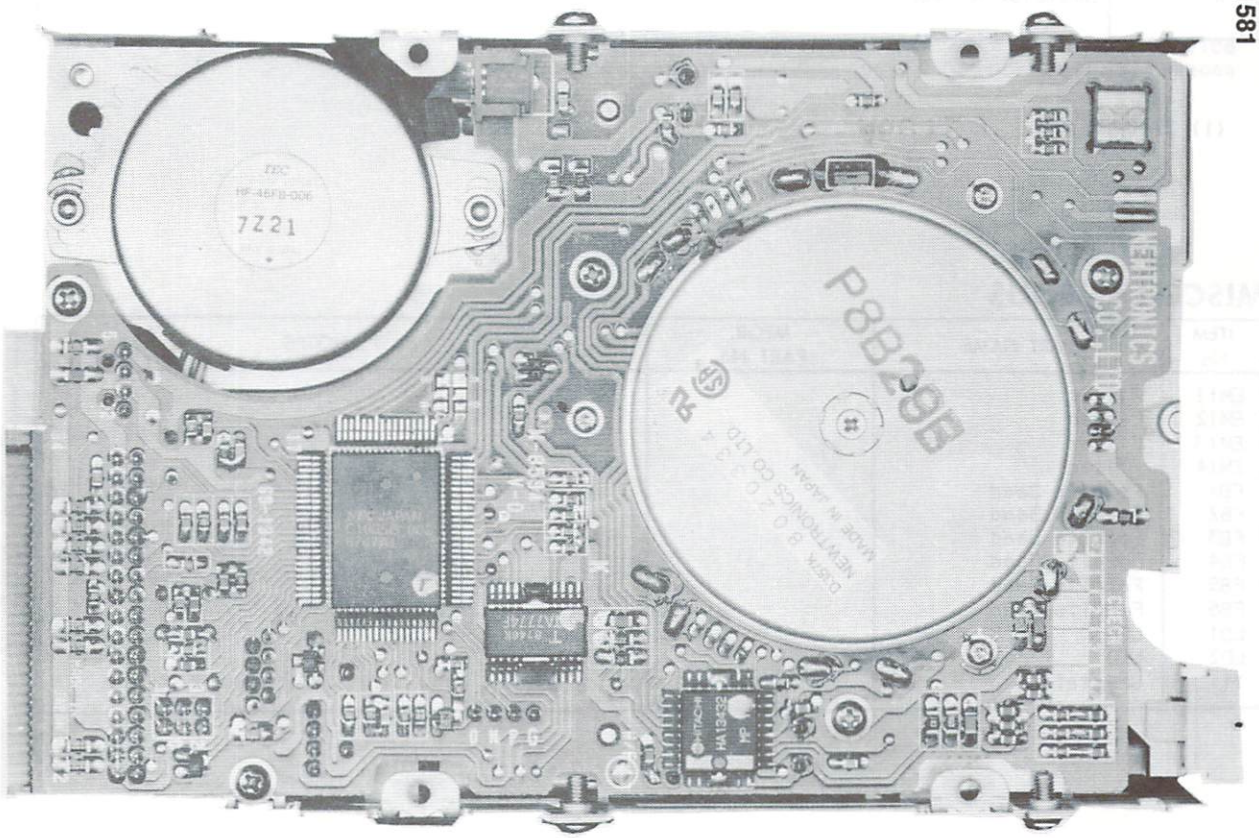


NOTE: ARROWS ON IC'S INDICATE PIN 1 UNLESS NOTED

A Howard W. Sams CIRCUITRACE® Photo



CHASSIS-TOP VIEW



CHASSIS- BOTTOM VIEW

PARTS LIST AND DESCRIPTION

When ordering parts, state Model, Part Number, and Description

SEMICONDUCTORS (Select replacement for best results)

ITEM No.	MFGR. PART No./ TYPE No.	NTE PART No.	ECG PART No.	TCE PART No.	NOTES
CR4					
U1	6502AD	NTE6502	ECG6502		
U2	312558-01				
U3	LC3664N-12				
U4	VL1772-02PC				
U5	8520A-1				
U6	74LS139N	NTE74LS139	ECG74LS139	SK74LS139	
U7	SN74LS00N	NTE74LS00	ECG74LS00	SK74LS00	
U8	7406N	NTE7406	ECG7406	SK7406	
U9	SN74LS14N	NTE74LS14	ECG74LS14	SK74LS14	
U10	74LS93PC	NTE74LS93	ECG74LS93	SK74LS93	
U11	7407N	NTE7407	ECG7407	SK7407	
U12	7406N	NTE7406	ECG7406	SK7406	
U13	74LS241N	NTE74LS241	ECG74LS241	SK74LS241	

RESISTORS (Power and Special)

ITEM No.	RATING	REPLACEMENT DATA		
		MFGR. PART No.	NTE PART No.	
RP2	Resistor Network	(1)		

(1) 2700 5% x 6

MISCELLANEOUS

ITEM No.	PART NAME	MFGR. PART No.	NOTES
EMI1	Filter		
EMI2	Filter		
EMI3	Filter		
EMI4	Filter		
FB1	Ferrite Bead		
FB2	Ferrite Bead		
FB3	Ferrite Bead		
FB4	Ferrite Bead		
FB5	Ferrite Bead		
FB6	Ferrite Bead		
LD1	LED		Drive
LD2	LED		Power
Y1	Crystal		

SCHEMATIC NOTES

—⌀— Circuitry not used in some versions
--- Circuitry used in some versions
⌀ See parts list
⏚ Ground
Chassis
▽ Common tie point

Waveforms and voltages taken from ground, unless noted otherwise.

Item numbers in rectangles appear in the alignment/adjustment instructions.

Resistors are 1/2W or less, 5% unless noted.

Value in () used in some versions.

Measurements with switching as shown, unless noted.

Supply voltage maintained as shown at input.

Voltages measured with digital meter.

Controls adjusted for normal operation.

Terminal identification may not be found on unit.

Capacitors are 50 volts or less, 5% unless noted.

Electrolytic Capacitors are 50 volts or less, 5% unless noted.

Logic Probe Display
L = Low
H = High
P = Pulse
* = Open (no lights On)

Logic Probe Indicates:

(7) L if diskette is write protected.
(9) L when the head is on track 00 and H when off track 00.
(13) H when drive motor is off.
(23) L with reset from host computer.
(24) H with reset from host computer.

Waveforms taken with triggered scope and Sweep/Time switch in Calibrate position, scope input set for DC coupling or 0 reference voltage waveforms. Switch to AC input to view waveforms after DC reference is measured when necessary. Each waveform is 10cm. width with DC reference voltage given at the bottom line of each waveform.

NOTE:
Voltages, waveforms and logic readings for Disk Drive Interface taken while running the following Basic program. Readings were taken when the disk drive head is not moving (drive is in read or write mode) unless noted.

NOTE: Insert a formatted diskette (not write protected) in Drive before running the program.

```
10 OPEN 3,8,3,"@0:SAMS,S,W"
20 FOR X=1 TO 50
30 PRINT#3, "HOWARD W SAMS"
40 NEXT X
50 CLOSE 3
60 GOTO 10
```

Use the following Track Seek program and procedure to step the Head to a specific track when specified in alignment procedure.

```
10 OPEN 15,8,15,"I"
20 OPEN 8,8,8,"#"
30 PRINT "TYPE 99 TO EXIT"
40 INPUT "TRACK ";T
50 IF T=99 THEN 90
60 T=T+1
70 PRINT#15,"U1:"8;0;T;0
80 GOTO 30
90 CLOSE 15:close 8
```

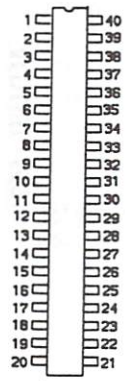
NOTE: Device Switch SW1 must be set to Device 8 (both switches up). Do not put any spaces in line 70.

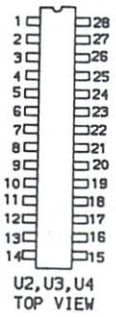
SERIAL INTERFACE CONNECTOR

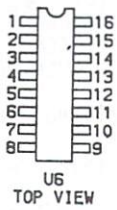
The 1581 serial bus supports the newer (FAST) serial communication as well as the standard (SLOW) serial communication.

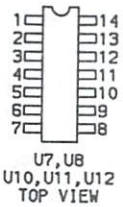
Pin No.	Signal	Direction	Function
Pin 1	SRQ Service Request	IN/OUT	Used by Fast serial bus as a bidirectional fast clock time. Unused by the Slow serial bus.
Pin 2	GND		Logic ground.
Pin 3	ATN Attention	IN	The host computer will bring this signal low, which in turn will generate an interrupt on the controller board. ATN is followed by a device address.
Pin 4	CLK	In/Out	CLK is used for timing the data sent on Slow serial bus.
Pin 5	DATA	In/Out	Data on the serial bus is transmitted one bit at a time.
Pin 6	Reset		This line will reset the peripheral upon host reset.

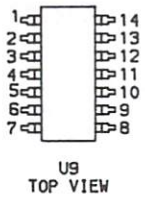
IC PINOUTS & TERMINAL GUIDES

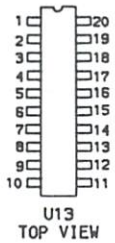


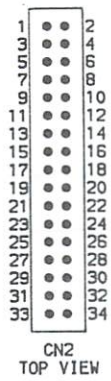




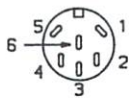


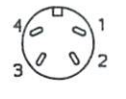












SEE PAGE 6

LINE DEFINITIONS

A0 THRU A15 ADDRESS BITS 0 THRU 15
ATN ATTENTION, SERIAL I/O PORT RECOGNITION
CHNG CHANGE
CLK, CLK 2 CLOCK TIMING PULSES
CS1 CHIP SELECT 1
CS2 CHIP SELECT 2
D0 THRU D7 DATA BITS 0 THRU 7
DATA RECEIVE DATA
DIR DIRECTION OF DATA FLOW
DRIVE SELECT 0 DISK DRIVE SELECT, HEAD 0
INDEX INDEX SENSOR PULSES
IRQ INTERRUPT REQUEST
MOTOR ON DRIVE MOTOR ON
R/W READ/WRITE
RESET RESET
RES RESET
READY READY
READ DATA READ DATA
SIDE SELECT DISK SIDE SELECT
SRQ SERVICE REQUEST
STEP STEPPER MOTOR DIRECTION CONTROL PULSES
TRACK 0 TRACK 00 SENSOR, DISK LOCATION OF FIRST TRACK
WRITE PROTECT WRITE PROTECT SENSOR STATUS, OVERWRITE PROTECTION
WRITE GATE WRITE GATE
WRITE DATA WRITE DATA

TEST EQUIPMENT

Test Equipment listed by Manufacturer illustrates typical or equivalent equipment used by SAMS' Engineers to obtain measurements and is compatible with most types used by field service technicians.

Equipment	B & K Precision Equipment No.	Sencore Equipment No.	Notes
OSCILLOSCOPE	1570A,1590A,1596	SC61	
LOGIC PROBE	DP51,DP21		
LOGIC PULSER	DP101,DP31		
DIGITAL VOM	2830,2806	DVM37,DVM56,SC61	
ANALOG VOM	277,111,116		
ISOLATION TRANSFORMER	TR110,1604,1653,1655	PR57	
FREQUENCY COUNTER	1803,1805	FC71,SC61	
COLOR BAR GENERATOR	1211A,1251,1260,1249	CG25,VA62	
RGB GENERATOR	1260,1249		
FUNCTION GENERATOR	3020,3011,3030		
HI-VOLTAGE PROBE VOM/DMM Accessory probes	HV-44 PR-28(HV)	HP200	
TEMPERATURE PROBE	TP-28,TP-30		
CRT ANALYZER	467,470	CR70	
DIGITAL IC TESTER	560,550,552		
CAPACITANCE ANALYZER		LC53,LC75,LC76 LC77	
INDUCTANCE ANALYZER		LC53,LC75,LC76 LC77	

TROUBLESHOOTING

POWER SUPPLY

Connect 120VAC to the input of power supply. Connect the output plug to connector CN6. Connect the negative lead of Digital Meter to pin 2 of CN6. Check for 5V at pin 1 of connector CN6 and 12V at pin 4 of connector CN6.

If either voltage is missing, check the power supply unit by substitution. If voltages are present, refer to the "CPU Operation" section of this Troubleshooting guide.

MICROPROCESSOR IC (CPU) OPERATION

Check the reset circuit for proper operation by checking the logic level on pin 40 of the CPU IC (U1) when the Disk Drive or the host computer is turned On. The logic reading should be low for about .2 seconds, then go High and stay High. If the reset is not working, check the logic readings on pins 10, 11, 12 and 13 of IC U9 and IC U12 and pins 17 and 34 of Interface IC U5.

Check the 1MHz clock waveform at pins 37 and 39 of CPU IC (U1). If waveform is missing at pin 37 of IC U1, check IC U8 for short between pin 1 and pin 7, check waveforms and components associated with IC U10, and IC U1.

Check for pulses on the data lines (pins 26 thru 33) and address lines (pins 9 thru 20 and 22 thru 25) of IC U1. If pulses are missing check the logic reading at pin 2 of IC U1, If the logic reading checks High, check IC U1 by substitution. If pulses are present, check the waveforms at pins 3 and 6 of IC U7 and pin 23 of Interface IC U5. If the waveform is missing at pin 3 of IC U7, check for pulses at pins 1 and 2 of IC U7. If pulses are missing at pins 1 or 2 check for pulses at pins 25 and 34 of the CPU IC U1, check the CPU IC by substitution.

DISK DRIVE INOPERATIVE

Check for 12V at the positive end of electrolytic capacitor C18, and check for 5V at the positive end of electrolytic capacitor C22. Check for 12V at pin 1 and 5V at pin 4 of connector CN1. If voltages are missing, refer to the power supply section of this troubleshooting guide. If voltages are present, check for logic reading low at pin 16 of connector CN2 when a load command is given from the host computer to the DISK DRIVE. Connect a jumper between pins 16 and 18 of connector CN2, If the drive motor starts turning, check logic readings at pins 3 and 4 of IC U5 and pins 1 and 2 of IC U11. If the Drive Motor will not start when pins 16 and 18 of CN2 are shorted together, check the Motor Drive unit by substitution.

STEPPING MOTOR INOPERATIVE

Check connector CN2 for good connections and check the stepper motor windings for continuity. If connector and motor check good, connect a computer to the drive and type in and run the following Basic Program to activate the stepper motor circuits:

```
10 OPEN 15,8,15,"I"
20 OPEN 8,8,8,"#"
30 PRINT#15,"U1:"8;0;1;0
40 PRINT#15,"U1:"8;0;30;0
50 GOTO 30
```

NOTE: Do not put any spaces in lines 30 or 40.

While the program is running, check for pulses at pins 10 and 11 of IC U8. If pulses are missing check IC U4 by substitution. If pulses are present at pin 11 and missing at pin 10 of IC U8, check IC U8 by substitution. If pulses are present, check the drive board by substitution.

WILL NOT READ

Connect a jumper from pin 2 of IC U11 to ground to keep the drive running. In read mode check for a logic High at pin 22 of IC U5. Check for a logic low at pin 19 of IC U4. If the reading at pin 19 is different check IC U4 by substitution. If the logic reading checks normal, check the Read/Write head by cleaning it with Isopropyl alcohol. If the Drive still will not read data, check the drive board by substitution.

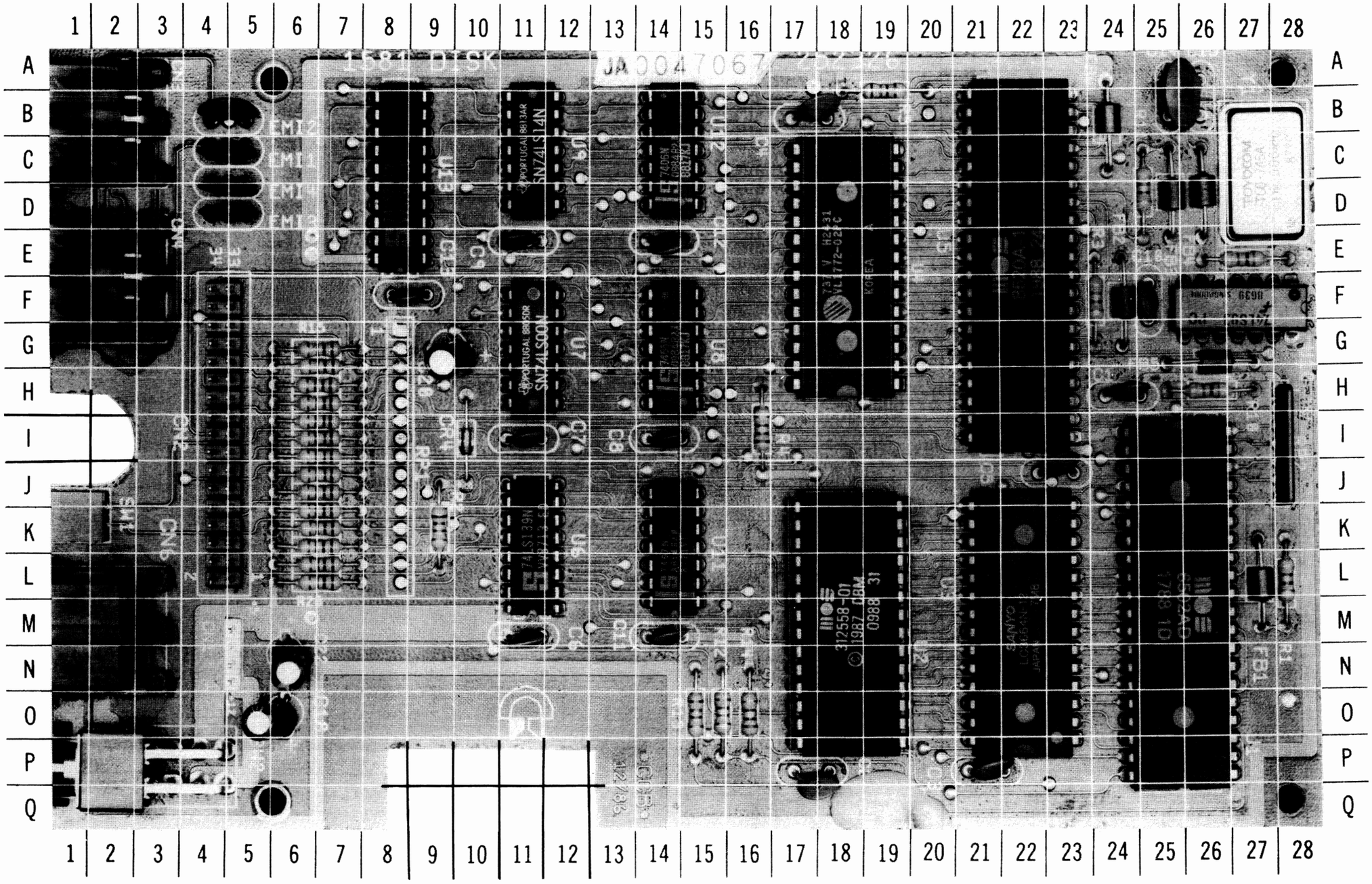
LOGIC CHART

PIN NO.	IC U1	PIN NO.	IC U1	PIN NO.	IC U2	PIN NO.	IC U2	PIN NO.	IC U3	PIN NO.	IC U3	PIN NO.	IC U4	PIN NO.	IC U4
1	L	21	L	1	H	15	P	1	*	15	P	1	P	15	H
2	H	22	P	2	P	16	P	2	P	16	P	2	P	16	L
3	P	23	P	3	P	17	P	3	P	17	P	3	P	17	H
4	P	24	P	4	P	18	P	4	P	18	P	4	P	18	P
5	*	25	P	5	P	19	P	5	P	19	P	5	P	19	P
6	H	26	P	6	P	20	L	6	P	20	P	6	P	20	H
7	P	27	P	7	P	21	P	7	P	21	P	7	P	21	L
8	H	28	P	8	P	22	P	8	P	22	P	8	P	22	L
9	P	29	P	9	P	23	P	9	P	23	P	9	P	23	H(9)
10	P	30	P	10	P	24	P	10	P	24	P	10	P	24	P
11	P	31	P	11	P	25	P	11	P	25	P	11	P	25	H(7)
12	P	32	P	12	P	26	P	12	P	26	H	12	P	26	L
13	P	33	P	13	P	27	P	13	P	27	P	13	H(23)	27	P
14	P	34	P	14	L	28	H	14	L	28	H	14	L	28	P
15	P	35	*												
16	P	36	*												
17	P	37	P												
18	P	38	H												
19	P	39	P												
20	P	40	H												

PIN NO.	IC U5	PIN NO.	IC U5	PIN NO.	IC U6	IC U7	IC U8	IC U9	IC U10	IC U11	IC U12	IC U13
1	L	21	P	1	P	P	P	P	P	L(13)	P	P
2	L	22	P	2	P	P	P	P	L	L(13)	P	L
3	L	23	P	3	P	P	L	P	L	L	P	P
4	L(13)	24	P	4	P	P	H	P	*	L	P	L
5	L	25	P	5	H	P	L	P	H	H	L	P
6	L	26	P	6	P	P	H	P	*	H	P	P
7	P	27	P	7	P	L	L	L	*	L	L	P
8	P	28	P	8	L	P	L	L(24)	P	P	P	H
9	H	29	P	9	H	L(24)	H	P	P	P	P	H
10	P	30	P	10	H	P	H	L	L	*	H	L
11	P	31	P	11	P	P	L	H	P	H	L	H
12	P	32	P	12	P	L(24)	L	L	L	P	H(23)	H
13	L	33	P	13	L	L(24)	*	H	*	P	L	L
14	P	34	H(23)	14	P	H	H	H	L	H	H	P
15	P	35	P	15	P							L
16	H(7)	36	P	16	H							L
17	L(24)	37	P	17								P
18	P	38	P	18								L
19	P	39	P	19								P
20	H	40	H(23)	20								H

CONTROL LOGIC BOARD
GridTrace LOCATION GUIDE

C1	H-24	U12	B-14
C2	O-17	U13	C-8
C3	P-21	Y1	B-28
C4	B-17		
C5	J-23		
C6	M-11		
C7	I-11		
C8	I-14		
C9	E-11		
C10	F-25		
C11	M-14		
C12	E-14		
C13	F-8		
C14	B-25		
C15	B-26		
C18	O-5		
C20	G-9		
C22	N-6		
CN1	M-5		
CN2	F-4		
CN3	B-3		
CN4	F-2		
CN6	M-2		
CR4	I-10		
EMI1	C-5		
EMI2	B-5		
EMI3	D-5		
EMI4	D-5		
FB1	L-27		
FB2	F-24		
FB3	D-25		
FB4	D-26		
FB5	G-26		
FB6	B-24		
R1	L-28		
R2	K-8		
R3	F-24		
R4	I-16		
R5	A-19		
R9	E-27		
R10	H-26		
R11	D-25		
R12	O-14		
R13	O-14		
R14	O-16		
R15	G-6		
R16	G-6		
R17	H-6		
R18	H-6		
R19	I-6		
R20	I-6		
R21	I-6		
R22	J-6		
R23	J-6		
R24	K-6		
R25	K-6		
R26	K-6		
R27	L-6		
R28	L-6		
RP2	I-26		
SW1	K-1		
SW2	P-2		
U1	M-25		
U2	M-18		
U3	M-23		
U4	E-18		
U5	E-22		
U6	K-11		
U7	G-11		
U8	G-14		
U9	C-11		
U10	F-27		
U11	K-14		



CONTROL LOGIC BOARD

A Howard W. Sams GRIDTRACE™ Photo

CONTROL LOGIC BOARD

COMMODORE MODEL 1581

CD22

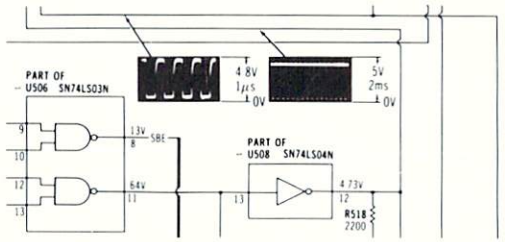
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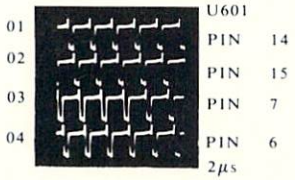


- Step by Step Troubleshooting guides the technician through the necessary procedures to quickly locate the problem.

TROUBLESHOOTING

MICROPROCESSOR CHIP (CPU) OPERATION

Verify the processor is functioning by checking the signals on the address lines (pins 10 thru 24 of IC U600) and the data lines (pins 41 thru 56) using a logic probe or a scope if a logic probe is used, refer to the "Logic Chart" for the correct readings. If a scope is used, the waveforms on the address lines (except pins 22 and 23 which have no signal in Power Up mode) should be similar to Figure 1. The waveforms on the data lines should be similar to Figure 2.

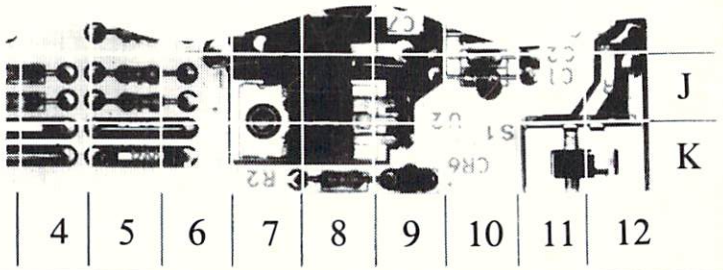


- Logic Chart containing logic probe readings to isolate defective circuitry and components.

LOGIC

PIN NO	IC U100	PIN NO	IC U100	PIN NO	IC U102	IC U103	IC U104	IC U105	IC U106	IC U107	IC U108	IC U109
1	P	21	P	1	L	L	L	L	L	I	I	I
2	P	22	P	2	P	P	P	P	P	P	P	P
3	P	23	P	3	H	H	H	H	H	H	H	H

- Quick Component Location using the SAMS exclusive GRIDTRACE, CIRCUITRACE, and component photographs.



- Complete Components Parts List in an easy to use format with field replacements shown when possible. SAMS unique semiconductor, chip and IC cross-reference gives you many replacements to choose from and is available at your Electronic Distributor.

SEMICONDUCTORS (Select replacement for best results)

			REPLACEMENT DATA				
ITEM No.	TYPE No.	MFGR. Part No.	ECG Part No.	NTE Part No.	RCA Part No.	ZENITH Part No.	NOTES
D102	1SS53	1149-2576	ECG519	NTE519	SK9091/177	103-131	
D103	2N60FM	1149-2527	ECG109	NTE109	SK3088	103-Z9001	
D201	1N4004GP	1201-4205	ECG116	NTE116	SK3312	212-76-02	
D501 thru D503	1SS53	1149-2576	ECG519	NTE519	SK9091/177	103-131	

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